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EXAMINER	
OLSEN, KAJ K	

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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/621,637	SHEN ET AL.	
	Examiner	Art Unit	
	KAJ K. OLSEN	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *01 December 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-67 and 70-132* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *35-51* is/are allowed.

6)☒ Claim(s) *1-13,29-34,52-67 and 70-132* is/are rejected.

7)☒ Claim(s) *14-28* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to the Request to Withdraw Final Office Action

1. Applicant has requested the previous final office to be withdrawn because claims 90 and 128-132 have not been examined by the examiner. This is only partially correct. In particular, the examiner has addressed claim 90 as it was among the rejected claims for broadening outside of the two-year statutory period. The examiner had not done an art rejection of this claim because he had withdrawn an art rejection of claims 13 in the examiner's answer of 7/17/2003. However, reviewing the Board decision of 3/28/2007, the examiner noticed that the Board has added a rejection of claim 13 to the record. Hence, the examiner here will add this rejection of claim 13 to the record. Because claims 65 and 90 set forth the same limitations, these claims will also be rejected over the further teaching of Grot as well. Moreover, applicant is correct that the examiner didn't notice new claims 128-132 and has now addressed these in this supplemental rejection. The previous final date of 2/11/2009 will be withdrawn.

Res Judicata

2. Claims 1, 2, 9-12, 29-34, 52, 54, and 61-64 of this reissue are identical to the claims 1, 2, 9-12, 29-34, 52, 54, and 61-64 presented to the Board of Appeals in Reexamination 90/006,209. The rejection of these claims was affirmed in the Board decision of 3/28/2007. Hence, the claims 1, 2, 9-12, 29-34, 52, 54, and 61-64 are rejected on the grounds of *Res Judicata* and the applicant is not entitled to further adjudication of the issues concerning these claims.

Specification

3. The examiner has withdrawn the outstanding objection to the specification in view of the amendment of 12/01/2008.

Reissue Applications

4. Claims 66, 67, and 70-127 are rejected under 35 U.S.C. 251 as being broadened in a reissue application filed outside the two year statutory period. In independent claims 66, 67, 73, 76, and 77, the preamble of the claims has been broadened from "for quantitative measurement" in the originally filed claims to "for measurement". In independent claims 78, 112, and 126, the limitation beginning "a first protonic conductive electrolyte," the "sensing electrode reacting" has been broadened to "the sensing electrode *being capable of* reacting" (emphasis added). In independent claims 112 and 126, the limitation beginning "whereby, in a positive ambient concentration", the previous "means detects changes" has been broadened to "means *is capable of* detecting changes" (emphasis added). A claim is broader in scope than the original claims if it contains within its scope any conceivable product or process which would not have infringed the original patent. A claim is broadened if it is broader in any one respect even though it may be narrower in other respects.

5. Claims 66, 67, and 70-127 are rejected under 35 U.S.C. 251 as being improperly broadened in a reissue application made and sworn to by the assignee and not the patentee. A claim is broader in scope than the original claims if it contains within its scope any conceivable product or process which would have infringed the original patent. A claim is broadened if it is

broader in any one respect even though it may be narrower in other respects. See the discussion above the instances of broadening in new claims 66, 67, and 70-127.

6. The previous objection under 37 CFR 1.172(a) (see paragraph 5 from the 5/30/2008 office action) has been withdrawn in view of the specified reel and frame numbers in the supplemental certificate under 37 CFR § 3.73(b) filed on 12/01/2008.

Claim Objections

7. Claim 128 is objected to because of the following informalities: Tetrafluoroethylene is misspelled in the claim. Compare the spelling here with the spelling in col. 8, l. 45. Appropriate correction is required.

Claim Rejections - 35 USC § 112

8. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

9. Claims 6-8, 58-60, 83-85, and 118-120 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

10. Claims 6, 58, 83, and 118 are drawn to one of the sensing or counter electrodes being comprised of a film having a thickness in the range of 50-10,000 Å. It does not appear that

applicant has support for both this limitation and the limitation that one of the sensing or counter electrodes be comprised of a mixed conductive material. In particular, these limitations of claim 6, 18, 58, 83, 95, and 118 are cited when discussing the applicant's embodiment of an electrode comprising only a metal film. See fig. 6; col. 9, ll. 14-40 and col. 12, ll. 31-40 of the specification. However, fig. 6 does not read on the any of the independent claims 1, 52, 78, and 112 because each of these claims require a combination of proton and electron conductive materials, like disclosed in fig. 7. The specification makes it very clear that the embodiment of fig. 6 differs from fig. 7 in the absence of any proton conductive material (col. 13, ll. 25-27). There is nothing in the originally filed disclosure to suggest that these dimensions of claims 6, 18, 58, 83, 95, and 118 were also to be utilized with the proton conductive material containing electrodes of fig. 7. Furthermore, col. 6, ll. 48-50 states that one could take one of two different approaches to reducing the interface resistance, either introducing mixed proton-electronic conductor "or alternatively" use a thin film electron conductor electrode. Hence, the thin films of claims original claims 6, 18, and 58 were an *alternative* to the compositions of claims 13, 22, and 52 and were not complementary to each other. In fact, the only dimension ever given for an electrode like those for fig. 7 reads well away from the dimensions defined by claims 6, 18, 58, 83, 95, and 118. See col. 8, ll. 64-66 where it states that the sensing and counter electrodes preferably have a thickness of 0.1 mm. This preferred dimension exceeds the range of 50-10,000 Å for an electrode thickness by a factor of 100-20,000. In the originally filed disclosure, the independent claims defined the sensing and counter electrodes generically and would have read on either the electrodes of fig. 6 or 7. However, during prosecution, the electrode embodiment of fig. 6 was surrendered when applicant amended the independent claims to require the inclusion

of proton conductive material to the electrode. Claims 6-8, 58-60, 83-85, and 118-120 should thereby be cancelled in response to this office action.

11. The examiner has withdrawn the 112 first paragraph rejection of claims 18 and 95 from the claims listed above because these claims are drawn to the pump electrodes and applicant had support for this limitation in claim 21 of application 08/522,946.

12. Claim 75 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

13. Because much of claim 75 was incorporated into claim 73, much of claim 75 is now redundant repeating limitations already present in the parent claim.

Claim Rejections - 35 USC § 103

14. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

15. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later

invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

16. Claims 1, 5, 9, 11-13, 29-34, 52, 53, 57, 61, 63-65, 67, 71, 73, 75, 77, 78, 82, 86, 88-90, 106-113, 117, 121, and 123-127 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dempsey (USP 4,227,984) in view of Uchida (USP 5,474,857), Grot (5,330,860), and/or Vanderborgh et al (USP 4,804,592).

17. With respect to claim 1, Dempsey discloses an electrochemical gas sensor comprising a sensing electrode 13 and a counter electrode 10 both of which are permeable to water vapor and are inherently comprised of electrically conducting material (col. 4, lines 30-64). Dempsey further discloses a first protonic conductive electrolyte membrane 9 permeable to water and situated between and in contact with the sensing and counter electrodes (fig. 2, and col. 4, lines 49-51), and also discloses a means for electrical measurement electrically connecting the sensing and counter electrodes (fig. 3). Dempsey further discloses a means, containing a volume of water (1, 2), for exposing the counter electrode to water vapor (col. 4, lines 39-49). Dempsey does not explicitly disclose the use of sensing and/or counter electrodes having the set forth composition of electron conductive mixed material and proton conducting material, Dempsey did recognize that electrodes set forth in the fuel cell prior art would find utility for the sensor of Dempsey (col. 8, lines 30-63). Uchida teaches a particular electrode for use in fuel cells that comprises a combination of proton conducting material (i.e. Nafion) and carbon and platinum materials (col. 7, line 55 through col. 8, line 26) that satisfies the claimed percentages (see Reexamination 90/006,209 Request dated 1/29/2002, pp. 4 and 5). Grot also teaches the use of fuel cell electrodes having the claimed compositions (col. 4, line 35 through col. 5, line 2; and

col. 14, lines 15-27). Vanderborgh also teaches the incorporation of electrolyte material (polyperfluorosulfonic acid (PFSA)) into the electrode material into the electrode to increase the three phase interface and reduce the electrode resistance. See col. 2, ll. 37-43. Vanderborgh further teaches that such as electrode should includes first and second electrical conductors (C and Pt) that is 82 wt% where the proton conducting material PFSA is 18 wt%. See Table 1 in col. 8. It would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize the teaching of any of Uchida, Grot, and/or Vanderborgh for the sensor of Dempsey because these electrodes have shown previous favorable utility in the fuel cell art, and the substitution of one known fuel cell electrode composition for another, when the results are not unexpected, requires only routine skill in the art. Furthermore, the addition of an ionically conductive polymer to the electrodes of Dempsey would improve the electrical properties (e.g. decrease the effective electrode resistance (col. 2, ll. 42 and 43 of Vanderborgh or col. 4, lines 26-29 of Grot). Although Vanderborgh, Uchida and Grot are drawn principally towards fuel cell power sources, both Uchida and Grot recognized the utility of their teachings to include fuel cell sensors like those of Dempsey (see Uchida, col. 10, lines 60-64; and Grot, col. 1, lines 19-30). In addition, Dempsey recognized the utility of teachings from the general fuel cell art for the disclosed sensor (col. 8, lines 30-63).

18. With respect to claim 5, Figure 1 of Dempsey shows opposing surfaces where each surface has a sensing and counter electrode respectively. Moreover, fig. 1 also shows the working and counter electrodes embedded into the electrolyte membrane resulting in a nonplanar portion of the membrane at the point of the embedding. See fig. 1. This would read on the

claimed "substantially nonplanar" membrane giving the claim language its broadest reasonable interpretation.

19. With respect to claims 9 and 11, see Dempsey col. 6, l. 66 - col. 7, l. 16.

20. With respect to claim 12, all of Uchida, Grot, and Vanderborgh taught the use of a combination of carbon and Pt with Pt and C in the claimed ratios. See Uchida, col 7, ll. 59-62; see Grot, col. 14, ll. 15-27; see Vanderborgh, Table 1. Moreover, Vanderborgh explicitly taught the use of carbon black as the preferred source of carbon for the electrodes as it provides a high surface area. See col. 8, ll. 16-28. Hence, it would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize carbon black as the source of carbon for the electrodes of Uchida and Grot as well as carbon black provides a high surface area support that would maximize the utility of the highly expensive Pt metals.

21. With respect to claim 13, Dempsey describes electrodes formed from noble metals and in particular platinum metals (col. 7, l. 65 - col 8, l. 1) and ruthenium (Ru) is a platinum group metal and a noble metal. Further Grot identifies ruthenium and reduced oxides thereof as a suitable catalytic material that may be used with a carbon black support, such as that sold under the VULCAN trade designation (col. 4, ll. 56-61). One of ordinary skill in the art would have been motivated to form an electrode having the claimed percentages of ruthenium oxide and carbon black as Dempsey describes electrodes formed from noble metals and as Grot and Uchida teach that suitable electrodes for gas sensing applications may be formed having the claimed percentages of noble metals, such as ruthenium oxide, and carbon.

22. With respect to claims 29-34 and the use of the sensor for CO, alcohol, or NOx, see the Dempsey abstract. With respect to the use of the sensor with the gases hydrogen, H2S, and

H2O, that is only the intended use of the apparatus and the intended use need not be given further due consideration in determining patentability. The examiner would note that the applicant gave no other electrode compositions for the detection of hydrogen, H2S or H2O, indicating that the electrodes already set forth for the CO sensor would also be applicable for the other claimed compositions.

23. With respect to claims 52, 57, 61, 63 and 64 (those limitations not covered above) Dempsey also teaches the use of a reference electrode for the sensor (col. 4, lines 60-65) as well as a reservoir 1 containing both water and water vapor which would expose the counter electrode to both water and water vapor (col. 4, ll. 30-34).

24. With respect to claim 65, see the discussion of claim 13 above.

25. With respect to claims 53 and 113, Dempsey teaches a means for applying DC potential across the sensing and counter electrodes. See col. 2, l. 36 - col. 3, l. 38. Although Dempsey does not disclose this DC potential as being for the purpose of transporting gas away from the counter electrode, it would clearly be capable of providing said function.

26. With respect to claim 67, 73, and 75 (those limitations not covered above), because the electrode of Dempsey in view of Uchida, and/or Grot already rendered obvious the combination of catalytic electronic conducting material (e.g. Pt) and ion conducting material (e.g. Nafion) for the electrodes with overlapping composition to the electrodes of the instant invention, then such an electrode would inherently be capable of reacting with a gas in the absence of an applied or biased voltage to the sensing electrode. The fact that Dempsey operates its sensor using an applied voltage to the sensing electrode does not read free of this limitation because whether or

not a voltage is applied is how the sensor is to be utilized and does not further define the structure of the device.

27. With respect to claims 71 and 77 (those limitations not covered above), the sensing and counter electrodes of Dempsey are on opposite sides of the first protonic conductive electrolyte membrane. See fig. 1 and 3.

28. With respect to claims 78, 82, 86, 88-90, and 106-111 (those limitations not covered above), whether or not the sensor is operated at room temperature is only the intended use of the apparatus and the intended use need not be given further due consideration in determining patentability. It is noted however that the sensor of Dempsey can be utilized at room temperature as evidenced by col. 2, ll. 30-35. Furthermore, the means for electrical measurement of Dempsey is capable of detecting a change in electrical characteristic (i.e. current) in response to a positive ambient atmosphere concentration. See col. 11, ll. 8-30.

29. With respect to claims 112, 117, 121, and 123-125 (those limitations not covered above), whether or not the sensor is operated at room temperature is only the intended use of the apparatus and the intended use need not be given further due consideration in determining patentability. It is noted however that the sensor of Dempsey can be utilized at room temperature as evidenced by col. 2, ll. 30-35.

30. With respect to claims 126 and 127 (those limitations not covered above), whether or not the sensor is operated as a residential gas sensor merely constitutes the intended use of the sensor and the intended use need not be given further due consideration in determining patentability.

31. Claims 2, 54, 79, and 114 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dempsey in view of Grot, Uchida, and/or Vanderborgh as applied to claims 1, 52, 78, and 112 above, and further in view of La Conti et al (USP 4,820,386).

32. The references set forth all the limitations of the claims, but did not explicitly recite the presence of antifreeze. La Conti teaches adding materials such as glycols (a well known antifreeze) to the water to increase the effective temperature range for the sensor (col. 11, lines 42-49). It would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize the teachings of La Conti for the sensor of Dempsey in view of Grot, Uchida, or Vanderborgh in order to increase the temperature range of the sensor.

33. Claims 3, 55, 80, and 115 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dempsey in view of Grot, Uchida, and/or Vanderborgh as applied to claims 1, 52, 78, and 112 above, and further in view of Hielscher et al (USP 5,403,452).

34. The references set forth all the limitations of the claims, but did not explicitly recite that the surface area of the sensing electrode is smaller than the surface area of the counter electrode. Hielscher teaches in an alternate gas sensor that the counter electrode 2 should be larger than sensing electrode 1 (fig. 4 for example) so that the counter electrode's current density is less than the measuring electrode's current density. See col. 8, ll. 38-44. This is in accordance with the point the examiner made previously from Reexamination 90/006,209 (see p. 19 of the 7/17/2003 Examiner's Answer) in that it was known to make the counter electrode larger than the sensing electrode so that the counter electrode does not diffusion limit the sensor response. It would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize the teaching of Hielscher and make the sensing electrode smaller than the counter

electrode for the sensor of Dempsey and Uchida, Grot, and/or Vanderborgh in order to ensure that the counter electrode's current density is less than the current density at the working electrode thereby ensuring that the sensing electrode is the diffusion limiting electrode.

35. With respect to the remainder of claims, because the counter electrode of Dempsey is directly exposed to water vapor, the humidity would presumably be at or near 100%. Because the humidity at the counter electrode is greater than the humidity at the sensing electrode, a positive pressure of water vapor would be result.

36. Claims 4, 56, 81, and 116 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dempsey and Hielscher in view of Grot, Uchida, and/or Vanderborgh as applied to claims 3, 55, 80, and 115above, and further in view of La Conti et al.

37. The reference set forth all the limitations of the claims, but did not explicitly recite the use of a hydrophobic membrane separating the counter electrode from the water vapor. La Conti teaches that the placement of a water transport film between an electrode and a source of water vapor allows impure water sources to be utilized (such as the antifreeze taught above) (col. 11, lines 42-49). The water transport film used by La Conti is a hydrophobic polytetrafluoroethylene (col. 3, lines 62 and 63). It would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize the teaching of La Conti for the sensor of Dempsey, Hielscher, and Grot, Uchida, and/or Vanderborgh in order to prevent contamination of the counter electrode.

38. Claims 10, 62, 66, 70, 72, 74, 76, 87, 122, and 128-132 (and claims 67, 73, and 75 in the alternative) are rejected under 35 U.S.C. 103(a) as being unpatentable over Dempsey in view of

Grot, Uchida, and/or Vanderborgh as applied to claims 1, 52, 78, and 112 above, and further in view of Tomantschger et al (USP 5,302,274).

39. With respect to claims 10, 62, 87, and 122, the references set forth all the limitations of the claims, but did not explicitly recite the use of a hydrated metal oxide protonic conductor electrolyte. Tomantschger teaches in an alternate gas sensor a number of different electrolyte materials useable for gas sensors including a uranyl hydrogen phosphate tetrahydrate (col. 8, lines 37 and 38). It would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize the teaching of Tomantschger for the sensor of Dempsey in view of Grot, Uchida, and/or Vanderborgh because the substitution of one known electrolyte means for another, when the results are not unexpected, requires only routine skill in the art.

40. With respect to claims 66, 70, 72, 74, and 76 (those limitations not already discussed above), the references do not teach that the sensing and counter electrodes are the only two electrodes in contact with the electrolyte membrane. Rather, Dempsey teaches the presence of an additional reference electrode. However, Tomantschger teaches that it is unnecessary to have three electrodes for the gas sensor as only two are necessary for appropriate sensor operation. In particular, Tomantschger teaches that the gas sensor can comprise only a sensing and counter electrode where the presence of the gas being analyzed is determined based on an induced sensor response. See fig. 8 and 9; col. 9, ll. 1-19; and col. 10, ll. 10-20. Because this configuration of sensor reduces the number of electrodes and reduces the need for an applied potential across the sensor, it would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize the sensor configuration of Tomantschger for the sensor of Dempsey

in view of Uchida, Grot, and/or Vanderborgh in order to simplify the sensor construction and operation.

41. With respect to claims 67, 73, and 75 in the alternative, these claims were rejected earlier because the claim language drawn to operating the sensors in a non-biased manner or without applied voltage did not further define the actual structure of the sensor. However, even if these terms were to be interpreted as structurally further defining the claimed sensor, then these claims would be obvious over the further teaching of Tomantschger for the reasons set forth for claims 66, 70, 72, 74, and 76 above.

42. With respect to new claim 128, Dempsey in view of Grot, Uchida, and/or Vanderborgh set forth all the limitations of the claim (see the discussion of claim 1 above) and further disclosed where each of the sensing and counter electrodes would contain a combination of platinum and carbon (see the discussion of claim 12 above). With respect to the new limitations concerning the use of a copolymer having a tetrafluoroethylene backbone with a side chain of perfluorinated monomers containing a sulfonic acid group, col. 8, ll. 43-49 of the specification evidences that Nafion reads on this defined copolymer and Nafion is the polymer that Grot, Uchida, and Vanderborgh utilized in its electrodes. Moreover, Dempsey taught the use of this solid perfluorinated ion-exchange polymer Nafion as its electrolyte for the sensor. See the discussion above and in the previous office action. Dempsey in view of Grot, Uchida, and/or Vanderborgh did not explicitly recite that the sensing and counter electrodes are the only two electrodes in contact with the first protonic conductive electrolyte membrane. However, Tomantschger teaches that it is unnecessary to have three electrodes for the gas sensor as only two are necessary for appropriate sensor operation. In particular, Tomantschger teaches that the

gas sensor can comprise only a sensing and counter electrode where the presence of the gas being analyzed is determined based on an induced sensor response. See fig. 8 and 9; col. 9, ll. 1-19; and col. 10, ll. 10-20. Because this configuration of sensor reduces the number of electrodes and reduces the need for an applied potential across the sensor, it would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize the sensor configuration of Tomantschger for the sensor of Dempsey in view of Uchida, Grot, and/or Vanderborgh in order to simplify the sensor construction and operation. With respect to the sensor being a residential sensor, that is only the intended use of the apparatus and the intended use need not be given further due consideration in determining patentability.

43. With respect to claims 129 and 130, Dempsey utilizes a membrane that is 0.30 mm thick and 16 mm sensing and counter electrodes. See col. 11, ll. 58-67. With respect to the specific use of 15 mm for the sensing and counter electrodes, this is so close to the 16 mm of Dempsey that it constitutes an obvious difference over the area relied on by Dempsey. There is no particular criticality disclosed by the present invention for the specific use of 15 mm, nor is there any criticality to the use of 16 mm by the teaching of Dempsey. With respect to approximately 0.17 mm, finding the optimal thickness requires only routine skill in the art. *In re Boesch*, 617 F.2d 272, 205 USPQ 215 (CCPA 1980). Both the thickness and diameter positions were affirmed in the Appeal decision of 90/006,208.

44. With respect to claim 131, it would have been obvious to one having ordinary skill in the art at the time the invention was made to utilize at least 25% proton conductor material, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*,

105 USPQ 233. Moreover, Grot already teaches that the amount of proton conductor material can already extend up to 25% (col. 4, ll. 3-14).

45. With respect to claim 132, see the discussion for claim 3 above.

46. Claims 66, 70, 72, 74, 76, and 128-132 are rejected under 35 U.S.C. 103(a) as being unpatentable over Dempsey in view of Grot, Uchida, and/or Vanderborgh as applied to claims 1, 52, 78, and 112 above, and further in view of Nagata et al (USP 4,913,792).

47. The references set forth all the limitations of the claims, but did not teach that the sensing and counter electrodes are the only two electrodes in contact with the electrolyte membrane. Rather, Dempsey teaches the presence of an additional reference electrode. Nagata teaches an alternate gas sensor having three electrodes equivalent to the three electrodes of Dempsey (i.e. a sensing (or working) 2, a counter electrode 4, and a reference electrode 3). However, Nagata teaches that the sensor could be constructed without the presence of a reference electrode provided one is willing to utilize a suitably large counter electrode. Nagata further teaches that such a configuration would simplify sensor construction. See col. 7, l. 66 - col. 8, l. 11. It would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize the teaching of a two-electrode sensor configuration of Nagata for the sensor of Dempsey in view of Uchida, Grot, and/or Vanderborgh in order to simplify the sensor construction.

48. With respect to claims 128-132, most of the limitations of these claims were already rendered obvious by the teachings of Dempsey in view of Grot, Uchida, or Vanderborgh as discussed in the Tomantschger rejection above (see the preceding rejection). These references did not teach that the sensing and counter electrodes are the only two electrodes in contact with the electrolyte membrane. Rather, Dempsey teaches the presence of an additional reference

electrode. Nagata teaches an alternate gas sensor having three electrodes equivalent to the three electrodes of Dempsey (i.e. a sensing (or working) 2, a counter electrode 4, and a reference electrode 3). However, Nagata teaches that the sensor could be constructed without the presence of a reference electrode provided one is willing to utilize a suitably large counter electrode. Nagata further teaches that such a configuration would simplify sensor construction. See col. 7, l. 66 - col. 8, l. 11. It would have been obvious to one of ordinary skill in the art at the time the invention was being made to utilize the teaching of a two-electrode sensor configuration of Nagata for the sensor of Dempsey in view of Uchida, Grot, and/or Vanderborgh in order to simplify the sensor construction.

Allowable Subject Matter

49. Claims 14-28 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

50. Claims 35-51 are allowed.

51. The indication of allowable subject matter can be found in the previous office action and will not be reiterated here.

Response to Arguments

52. Applicant's arguments filed 12/01/2008 have been addressed in the previous final rejection and will not be reiterated here. The examiner will only address the arguments in the after final response. Applicant urged that the examiner had not addressed claims 90 and 128-

132. With respect to claim 90, this claim was previously only rejected over the improper broadening of its parent claim and hence had been addressed as the examiner erroneously presumed this claim was free of the prior art for the same reasons as claim 13. Reviewing the Board decision of 3/28/2007 in 90/006,209, the examiner realized the Board had added a rejection to claim 13. Hence, claim 90 is now being art rejected for the same reasons as claim 13 was in the Board decision.

53. With respect to claims 128-132, these new claims are now being addressed in this office action.

54. Applicant also had requested clarification as to claim 65, which was indicated as both being rejected under *Res Judicata* as well as indicated allowable. In reviewing the Board decision of 3/28/2007 in the proceedings of 90/006,209, claim 65 should be neither rejected under *Res Judicata* nor be indicated as being allowable because the Board came up with the prior art grounds of rejection. Claim 65 is now appropriately rejected only under prior art in this office action for the reasons set forth by the Board decision.

55. With respect to the *Res Judicata* issue, applicant urges that because the Board applied a new grounds of rejection to claims 5, 13, and 57, it is entirely proper for the applicants to argue patentability over the combination of these references with respect to these claims. The examiner would agree. However, the outstanding *Res Judicata* rejection doesn't concern any of these claims that the Board crafted a new grounds of rejection on. The claims rejected under *Res Judicata* above were claims that were finally rejected by the examiner and those rejections were affirmed by the Board. Hence, the rejection of claims 1, 2, 9-12, 29-34, 52, 54, and 61-64 is still final even if the rejection of claims 5, 13, and 57 must be non-final. The examiner rejections

above accurately reflect this. Claims 1, 2, 9-12, 29-34, 52, 54, and 61-64 are rejected under *Res Judicata* and the prior art, whereas claims 5, 13, and 57 are just rejected under prior art. The examiner would further include claim 65 in the list of claims that have a non-final decision because the grounds given by the Board for rejecting this claim did not come from the examiner. Applicant is entitled to further adjudication of claims 5, 13, 57, and 65, but is not entitled to further adjudication of claims 1, 2, 9-12, 29-34, 52, 54, and 61-64.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to KAJ K. OLSEN whose telephone number is (571)272-1344. The examiner can normally be reached on M-F 5:30-2:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam X. Nguyen can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Kaj K Olsen/
Primary Examiner, Art Unit 1795
April 16, 2009